Shifting Our Fate with Plastics
From a Linear to Circular Economy
Responding to the Challenges Facing Recycling in the United States

JUNE 17, 2020

The Senate Committee on Environment and Public Works will hold an oversight hearing entitled, “Responding to the challenges facing recycling in the United States.”
Material Collected at MRF

- Fiber: 70%
- Other: 25%
- Plastic: 5%

U.S. Postconsumer Plastic Recycled in 2018

- PET Bottles: 36%
- Non-Bottle Rigid: 24%
- HDPE Bottles: 20%
- Film: 20%

Change from 2017 to 2018 (estimated, in pounds)
- PET: + 87M
- HDPE Bottles: - 35M
- Non-Bottle Rigid: - 47M
- Film: - 4M
What is Circularity? (and why does it matter?)

• [KennisKaarten]: Circularity focuses on resource cycles, while sustainability is more broadly related to people, the planet and the economy. Circularity and sustainability stand in a long tradition of related visions, models and theories.

• [US Chamber of Commerce]: The practice of circularity is...a human construct designed to support the conversion of raw materials for human consumption beyond simple survival needs of food and water. The intentional design of a system is what separates circularity from sustainability.

• [Ellen MacArthur Foundation]: A circular economy aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural, and social capital. It is based on three principles:
  • Design out waste and pollution
  • Keep products and materials in use
  • Regenerate natural systems
Successful Recycling is a Part of Circularity

Material Flow

Virgin Material Producers

Chemical Recycling

Recycled Material Processors

PRODUCE QUALITY RECYCLED FEEDSTOCK

Sorters/Consolidators

Landfill, WTE, Litter and Marine Debris

LIMIT

Collectors

RECYCLE RIGHT

Citizens

BUY PRODUCTS MADE WITH RECYCLED CONTENT

Government/Institutions

Commercial Businesses/Organizations

Brand Companies/Manufacturers

Design & Conversion

Converters

Resin Production

USE RECYCLED CONTENT

Purchase & Use

Education & Collection

Stakeholders

Stakeholders

Actions to Drive Circularity

Actions to Drive Circularity

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Challenges to Circularity
Barriers Throughout the Value Chain for Plastic Circularity

Cost to Reclaim plastic sometimes 2x Virgin

2018 Plastic Recycling Rate <9%

>$20 Billion US Fossil Fuel Subsidies (excluding externalized env and human health costs)
Source: PriceofOil.org

Average Cost to Landfill in the U.S. <2.5¢/lb. (In Europe >5¢)

Needs and Purchases in a Pandemic
Recycled Plastic Is More Expensive than Virgin Plastic/Resin

Recycling processes can't be expected to close the price gap completely.

PCR CHDPE = Postconsumer Resin colored High Density Polyethylene
PCR NHDPE = Postconsumer Resin natural (colorless) High Density Polyethylene
Predicted Future Growth in Plastic Relative to Oil and Gas

Petrochemicals and refined products markets, cumulative

Million Tons

2010 2015 2020 2025 2030 2035 2040

0 100 300 500 700 900 1200

Petrochemicals products

Refined products

Source: IHS Markit

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Thanks to ISH Markit for stats and charts from NEW Study:
Changing Course: Plastics, Carbon, and the Transition to Circularity
Covid-19 Catalyst for Plastic Production — from Virgin

- Medical and pharma driving growth in demand for plastics (PPE, in particular)
- Accelerated adoption of E-commerce in retail, food, home goods, etc.
- Balance between supporting local restaurants for take-out with waste produced

Source: https://www.cdc.gov/patientsafety/features/before-surgery.html
Plastic Paradox – Trading off growth in GHG emissions to avoid plastic waste

**GHG Savings**
Use of plastics cuts food waste & fuel consumption, reducing GHG emissions and therefore mitigating climate change

**Plastic Waste**
Use of plastics creates massive pollution, severely harming the planet
Can we decrease GHG emissions AND curb plastic waste?

Greenhouse Gas Sources

- Buildings (On Site): 6%
- Transportation: 14%
- Industry: 21%
- Food, Agriculture, Land Use: 24%
- Electricity Production: 25%
- Other: 10%

Source: IPCC WG3

U.N. SAYS 30% OF FOOD WASTED GLOBALLY

Food Waste Adds 8% to Total GHG Emissions

Examples of Plastic Packaging Innovation

- **Beef Packaging**
  - Original: Polystyrene foam tray with cling wrap
  - New: Vacuum packing in oxygen barrier film
  - Result: Shelf life extended from 4 days up to 30 days

- **Grapes Packaging**
  - Original: Sold loose
  - New: Perforated plastic bags
  - Result: Bagging leads to 20% reduction in in-store waste

Source: 2016 American Chemical Society

What are the trade-offs of alternatives?

What’s needed to shift consumption patterns?
Essential to Transition from a Linear to a Circular Economy

Linear System
- Take
- Make
- Waste

Better Data for Better Policy & Decisions in the Transition to Circularity

Circular System
- Education & Collector
- Resin Production
- Design & Conversion
- Mechanical &magneto Recyling
- Sortation & Transportation
- Purchase & Use

Climate Change
- Waste
Solutions need to be on same scale as the problem

U.S. Polyolefin Capacity

- Majority of Postconsumer Reclaimers
  - Bottles
  - Non-Bottle Rigid
  - Film

10 Largest Virgin Producers

Less than 5%

Polyolefin Capacity
Recycling Capacity

Source: IHS Markit and More Recycling
Note: Approximate figure includes existing reclamation capacity in 2019. It does not include announced future capacity.
Where to Start? Consider PET Recycling

National PET Recycling
Rate dropped in 2018
Recycling is Critical to Climate Action

Carbon Avoidance of Mechanical Recycling of PET

- Mech Recycled rPET
- PET with 30% rPET
- vPET from Ethane or Naphtha

Source: IHSMarkit
• Companies, governments, and others working together to meet goals by 2025.

• **Goal that plastics never become waste.**
  • Eliminate certain ‘problematic/unnecessary’ packaging
  • Innovates so that 100% packaging is reusable, recyclable or compostable
  • Drive use of recycled content or responsibly sourced bio-based plastic

• Keep plastics out of environment and in the circular economy

www.usplasticspact.org
One product can have big impact on demand

### 6 BILLION POUNDS: TOTAL WEIGHT OF PE USED IN ANNUALLY IN U.S. TRASH BAG PRODUCTION

The impact if different levels of PCR were used in the sector:

<table>
<thead>
<tr>
<th>PCR level</th>
<th>Pounds of recycled resin needed</th>
<th>Portion of total volume of PE currently reclaimed in U.S.</th>
<th>Metric tons of CO2 equivalent avoided</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 percent</td>
<td>600 million</td>
<td>32 percent</td>
<td>270,276 (equal to emissions of roughly 58,000 cars in one year)</td>
</tr>
<tr>
<td>30 percent</td>
<td>1.8 billion</td>
<td>95 percent</td>
<td>810,828 (equal to 173,000 cars)</td>
</tr>
<tr>
<td>70 percent</td>
<td>4.2 billion</td>
<td>222 percent</td>
<td>1,891,831 (equal to 403,000 cars)</td>
</tr>
<tr>
<td>97 percent</td>
<td>5.8 billion</td>
<td>308 percent</td>
<td>2,621,277 (equal to 558,000 cars)</td>
</tr>
</tbody>
</table>

Numbers were tabulated by More Recycling using information from several private reports as well as the U.S. EPA's WARM calculator and extrapolation of California's most recent waste characterization study.

Data sort is produced each quarter by More Recycling. For additional information, go to morerecycling.com
Key Takeaways from Recommendations Document:

• **You can track what you can’t measure**—Agency action to strengthen data collection

• **There is no single solution** to solve all plastic recycling and waste problems
  - EPR, Deposit System, & Recycled Content Requirements
  - Bans on problematic or unnecessary packaging
  - Develop and adopt reusable packaging systems

• Setting **high targets drive innovation** when not overly prescriptive

Collaboration across the value chain

Plastic Recycling Decision Tree

Confirm the key 3 fundamental elements in the recycling infrastructure are in place to facilitate recycling of your package, then you can encourage consumers to recycle your package.
Conclusion: We need Local & Global Solutions for Circularity

- **Policy** — Local, State, Federal, Global (e.g., EPR with eco-modulation, min content, bottle bills, carbon policy, regulate toxins)
- **Innovation** — Track supply chains, carbon, env impact to consider externalized env and health costs
- **Mobilize and Incentivize Citizens** — Actions for Circularity
  - Buy less and local whenever possible
  - Support better science for better policy and navigate tradeoffs
    - Consider:
      - GHG, Water consumption & Energy use
      - Toxicity of plastics and alternatives
      - Performance
      - Supply of base feedstocks and security of resources for future generations
  - Incentivize reuse and encourage companies to design for reuse and durability
  - Pick up litter
  - Recycle right
  - Buy recycled and designed for recovery

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The potential for innovation through inspiration from nature is as great as the risk we face by ignoring nature’s signals. We must unlock that innovation.

We need to find a way to get back into balance.

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